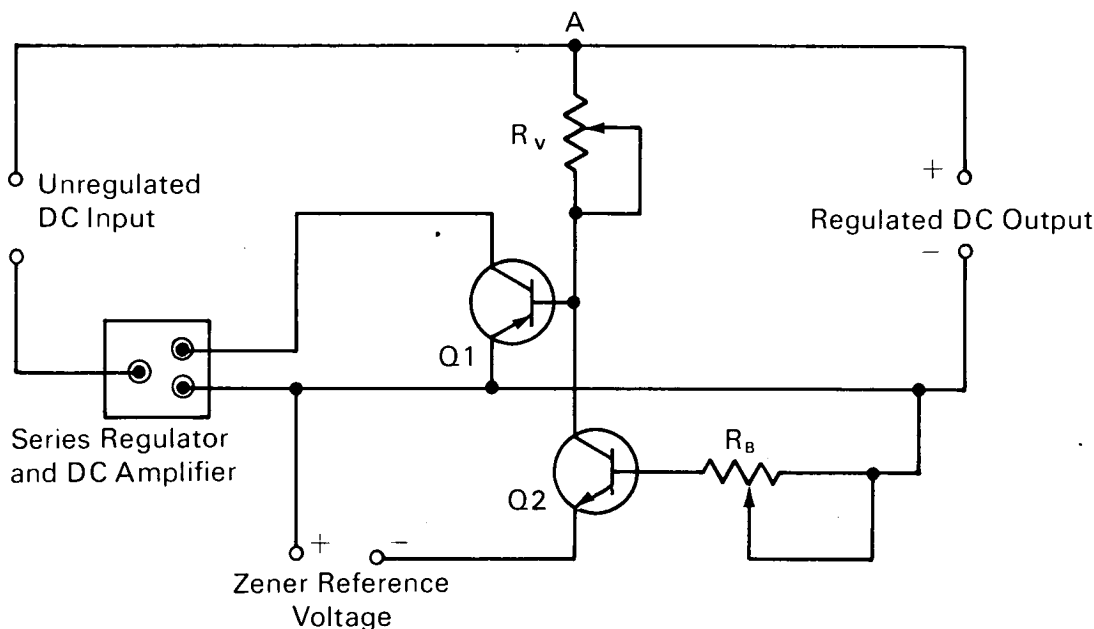


# NASA TECH BRIEF



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## Improved DC Voltage Regulator



An improved, simplified solid-state circuit has been designed to provide a closely regulated dc voltage from an unregulated dc source. The circuit eliminates the undesirable loading effect of the emitter-base current of a transistor used in an error-sensing circuit of a regulated dc power supply. This circuit is less complex (uses fewer components) than conventional regulators and should find application in timing circuits, signal-conditioning systems, computer systems, and test equipment requiring closely regulated dc voltages.

A constant current is obtained across the voltage-control potentiometer,  $R_v$ . This current ensures 100 percent application of an error signal to the base of Q1, the error-sensing transistor. The constant

current is maintained by using Q2 to compensate for the current changes appearing in the emitter-base circuit of Q1. The bias of Q2 is controlled by potentiometer  $R_b$ . A setting towards one end of this potentiometer will cause output voltage at point "A" to rise with an increase of load current. A setting towards the other end of the potentiometer will have the opposite effect; that is, an increase of load current will cause a drop in output voltage at point "A". Therefore,  $R_b$  is adjusted at an intermediate value to compensate for the changes in base current of Q1 by an opposite change in current in the collector circuit of Q2. The reference voltage is controlled by a zener diode connected to a separate supply voltage.

(continued overleaf)

As an example of the operation of the circuit, if the output load current increases, the voltage at point "A" would tend to drop, providing an error signal to the base of Q1 which causes the potential of the base to move towards the potential at the collector of Q1. This results in an increased collector current (error signal) to be applied to the series regulator-amplifier and thus maintain the output voltage at the desired level.

**Note:**

No further documentation is available. Inquiries may be directed to:

Technology Utilization Officer  
Kennedy Space Center  
Kennedy Space Center, Florida 32899  
Reference: B69-10369

**Patent status:**

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